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ABSTRACT

This paper explores research on problem solving and suggests a problem-solving approach to elementary school social studies, using a culture study of the ancient Egyptians and King Tut as a sample unit. The premise is that problem solving is particularly effective in dealing with problems which do not have one simple and correct answer but rather require originality, flexibility, and fluency for solution. A review of research indicates that although problem solving is very important for young children and can be systematically incorporated into a program for training, it is currently a relatively neglected skill in elementary education. To stimulate problem-solving skills among children, the author suggests that classroom teachers use a teaching approach based on seven steps--play, question, hypothesize, research, children share, teacher shares, and evaluate thinking. The sample culture unit based on King Tut and the ancient Egyptians begins with a brief teacher introduction of Egyptian culture and then directs students to participate in a variety of activities including drawing a time line, locating Egypt on maps and globes, role-playing pyramid building and King Tut's burial, posing questions touched upon in the play about King Tut and pyramid building, hypothesizing about possible answers to these questions, researching answers from teacher-prepared charts and readings, and discussing and evaluating answers in class. The document concludes with suggestions on selecting problem-solving topics and identifying social studies learning objectives. (DB)

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PROBLEM SOLVING WITH THE ELEMENTARY YOUNGSTER

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Chapter 1

INTRODUCTION

With current educational priorities continuing to point toward "the basics" and mounting lists of student learning objectives, educators are now more than ever before needing the most effective, practical, and efficient teaching methods available. An unfortunate side-effect of increasing accountability standards could be the discouragement of those teachers wishing to deviate from traditionally accepted teaching methods into other more creative activities that could potentially be superior and still teach the "basics."

It is not uncommon for teachers, parents, and students alike to question current priorities in the schools. What is it we are trying to accomplish at school? Surely we want more than the mere acquisition or mastery of specific skills within each artificially divided subject area. Should we not be aiming towards the ability to "put it all together" in meaningful ways? Is or should problem solving be a valued skill? How can we best teach children to use higher levels of thinking?

It has been suggested that one of our ultimate goals in education is to help every child to prepare for a world of rapid change and unforeseeable demands. "Coping" can be defined as any attempt to

master a new situation that can be potentially threatening, frustrating, challenging, or gratifying. Problem solving can be an approach to resolving frustration and conflict and there is a particular need for these skills in the adult and adolescent years. Indeed, problem solving is one element in the development of "independence" (Hertzog, 1977).

STATEMENT OF THE PROBLEM

The underlying conviction of this project, as shared by Piaget, is that intelligence stems from action and that thinking through ideas without the use of manipulative materials is not entirely possible until the end of the elementary years (Hirsch, 1974). However, despite the validity and popularity of Piaget's theory of the importance of manipulative learning, our schools tend to turn to workbooks, worksheets, and other abstract activities in lieu of concrete teaching methods sometime before the second or third grade.

It is this inconsistency between theory and practice, along with the virtual absence of problem solving amongst school district objectives, that prompted the author to research practical learning strategies that could be used to improve concept formation and problem solving with 6 - 11-year-olds.

PURPOSE OF THE STUDY

The purpose of the study was to research the effectiveness of using concrete materials and teaching methods to stimulate high levels of thinking in general, and problem solving skills in particular.

DEFINITION OF TERMS

Abstract Learning - involves the formal thinking that occurs within one's head without the use of concrete manipulatives. Piaget claims that this ability usually occurs around the age of 11. He refers to this developmental stage of learning as the "Formal Operational Period."

Concrete Learning - is learning that is stimulated by "hands on," manipulative types of activities. Piaget claims that 7 - 11-year-olds internalize concepts by using concrete manipulatives while they are still in the "Concrete Operational Period." Concrete learning occurs before the stage of abstract learning is reached.

High Levels of Thinking - refers to the thinking skills involved in hypothesizing, evaluating, interpreting, and synthesizing of information as opposed to the lower levels of thought involved in recalling, memory work, rote drill, making direct inferences, etc.

Chapter 2

REVIEW OF RELATED LITERATURE

What is Problem Solving?

In a problem solving situation a person must overcome obstacles or difficulties to achieve a goal. A key factor in problem solving is the application of past experiences to arrive at a solution not previously known to the person - at least in the particular situation presented. The fact that past experiences supplies the required information or skill for solution distinguishes problem solving from learning. The original acquisition of the responses themselves is referred to as "learning." Because the distinction is not always clear, some refer to problem solving as "complex learning," for new patterns of learning can be revealed (Vinacke, 1971).

Whereas some problems have "correct" answers, many others do not. These creative tasks call on the skills of originality, flexibility, and fluency. Research seems to support that these kinds of behaviors can be incorporated systematically into a program of training (Vinacke, 1971).

Stages and Characteristics of Problem Solving

Deliberate actions to overcome obstacles early in infancy can be regarded as solving problems. It is not until the age of two, however, that children begin to solve problems by thinking of possible solutions without trying them immediately. By the elementary years children can come up with ingenious solutions to problems. As our mental abilities develop, problem solving becomes easier. According to psychologists,

the main steps are perception, memory, and applying hypotheses. Whether the problem is solved or not, the child will store away information from this experience to use in future situations (Ambron, 1975, p. 334).

The third of Piaget's famous developmental stages of cognitive learning is the Concrete Operational Period that usually occurs between the ages of seven and eleven years. During this period high levels of mental activity can take place but true understanding is not entirely possible without the use of concrete objects and/or activities (Ambron, 1975, p. 345). Somewhere around the eleventh year a child reaches the Formal Operational Period. It is not until this stage of cognitive development that a child can truly think abstractly. Children at this stage of development can imagine several alternative explanations of the same phenomenon, all within their heads and without the use or stimulation of concrete activities (Ambron, 1975, p. 406).

Few will dispute the importance of concrete manipulatives in preschool and kindergarten learning. But research seems to suggest that such active learning is just as important in the elementary years. Perhaps concrete learning during the Concrete Operational Period - beyond preschool - is more accurate as far as concept formation is concerned. Musick (1977) found that the mere experience of motoric action does not automatically lead to a valid conceptualization. Young children - i.e. preschool age - are particularly limited in their ability to correctly extract concepts from their own motoric experiences. In a study involving perception and block play, Goodson (1977) concluded that ...

> ...The process by which children become able to comprehend and produce block structures of higher-order complexity appears to involve at least the development of accurate perceptual and conceptual representation, as well as strategies for mental organizing..."

Such conclusions may suggest that older children, aged 6-11, could more effectively and accurately gain concepts and understanding through block play, for their cognitive, perceptual, and conceptual skills are better developed.

Manipulatives and Problem Solving

A number of studies support the underlying conviction of Piaget's stages of cognitive development. The hypothesis that children shift from an outerdirected to an innerdirected problem solving style as age increases has been supported. "Outerdirectedness" was defined as a style of problem solving characterized by a reliance on concrete situational cues rather than by one's own cognitive/abstract resources. It was also found that girls were not any more or less outerdirected than boys (MacMillan, 1974).

Barrett (1975) claimed that formal thinking is a highly significant yet relatively neglected aspect of development with 12-14-year-olds. His study found that combinatorial problem solving skills were significantly facilitated if problems involved "concrete" materials of low complexity. Sticht has argued that the facilitation of formal reasoning skills demands more directive techniques that should move from the concrete to the abstract and from the whole to the parts (Barratt, 1975).

Mastery motivation, defined as the desire to solve problems for the sake of discovering a solution, was found to be the major motivator for ten-year-olds in one study. Contrary to prediction, the need for approval was not the major motivator even for four-year-olds to solve problems

(Harter, 1975). This study suggested that youngsters both at the preschool and primary level are motivated and attracted to problem solving situations that require and/or allow active involvement. It also supports the hypothesis that the desire to solve cognitively challenging problems for the gratification inherent in discovering the solution is a particularly strong motive for children at a very young developmental level.

Kennedy (1976) classified a large number of games in accordance with the Guilford's Structure of Intellect model and systematically used them in a program designed to develop problem solving and related skills in children K-2. Her study suggested that games, implying a concrete, "hands on" type of informal learning, can be effectively used in the development of problem solving/cognitive skills in young children. Under her primary goal of developing independent problem solving skills in young children were four sub-goals including the development and coordination of analytic thinking skills along with the related personality skills of persistence and self-confidence using a five-stage problem solving process. The total program, involving 45 minutes a day, seemed to be successful.

According to Trueblood (1977) in his article Gaming in Early Childhood Education, a game's major objective should be to stimulate children to continue to engage in problem solving behavior that grows out of the questions posed during the game or play. He claimed that gaming in early childhood is an essential activity that can be viewed from both the developmental (Piagetian) and behavioral perspectives.

> Gaming from a developmental perspective involves exploration, observation, challenges, through questioning, justifications

> given for the responses to the challenges, extending conceptual abilities and advancing. Each of the components of the procedure involved in the gaming process helps facilitate the intellectual development of the young child. Basic to gaming is the child's ability to solve logical problems presented (Trueblood, 1977, p.7).

Another researcher addressed his study, however, to the lack of retention and transfer found in some games and questioned whether the games provided meaningful experience or enactive involvement (Staso, 1978).

Effect of Classroom Structure and Teaching Style on Problem Solving

A review of the studies on creativity training indicates that the most successful approaches provide for active student involvement, capture student interest, and allow for emotional as well as cognitive functioning (Staso, 1978). Clearly creativity is a valued quality and can be an asset in the problem solving process. There tends to be some evidence that classroom atmosphere, flexibility, and structure has an influence on the development or encouragement of such qualities. One study confirmed the hypothesis that informal, progressive teaching would promote divergent thinking abilities more than formal, subject-centered teaching (Haddon, 1968). Another study found that low-anxiety students were more creative in open as compared to structured classrooms (Klein, 1975). One study even found that the classes of teachers who were low in creative ability themselves had lower means in this area (Shivley, 1972).

In addition to achieving significantly higher scores for total creative expression, McCormick's study also found higher scores on sub-scales for productivity, communicability of ideas, and richness of thinking from open classrooms. The author offered two possible explanations for the results.

> First, open classrooms emphasize individual freedom and innovation, while the traditional approach stresses learning existing solutions for problems rather than approaches to problem solving. Second, open classrooms develop the self-esteem and confidence needed to perform in nonstructured situations, enabling even the youngest children to express their creativity more fully (McCormick, 1978).

The role of attitudes and self-esteem cannot be underplayed. A second author in a separate study concluded that

> ...The fact that certain significant relationships between the affective variables and creative problem-solving performance were obtained pointed to the importance of...self-esteem in influencing creative performance at the different stages of problem solving (Sherman, 1977).

What kind of climate would be ideal in the classroom to promote problem solving? Bovos (1977), in a lecture to early childhood educators, said that it would be a classroom that 1) provided opportunities for choices and decisions to be made, 2) provided opportunities to examine and explore the consequences of their choice, 3) promoted the feeling that "it's okay" to make mistakes, 4) provided for opportunities for children to set their own goals and expectations, and 5) made it clear that children's ideas were important to adults.

The teacher acts as a stimulating agent to the children in the classroom, according to Heimbeck (1978). Children in a neautral, uneventful state of mind learn very little or nothing. It is not until this state of "equilibrium" is thrown out of balance that true, meaningful learning occurs. It is therefore our job as teachers to somehow disturb this equilibrium. This concept of learning discounts the constant external "pushing" of material into the child's mind. It instead calls first for a desire and purpose for learning that comes from within. Problem solving behavior, involving active manipulation, questioning, and hypothesizing is perhaps one of the best ways to promote a state of

disequilibrium so that meaningful learning can occur (Heimbeck, 1978).

As far as concept acquisition goes, a significant interaction between teaching strategies and developmental stages has been found. The results of one study indicate that an inductive strategy was more effective for students at Piaget's Preoperational stage, and that a deductive strategy was more effective for those at the Concrete Operational stage of concept acquisition (Na, 1978). Even Wright, in his extensive study of sixth graders, concluded that deductive teaching was significantly more effective than inductive instruction in critical thinking (Wright, 1977). Formal problem solving teaching strategies fit into this category.

Group Problem Solving

Social psychologists have long been interested as to how two or more individuals deal with tasks that involve problem solving or a joint solution. Egerblach found that groups of two or three students working together scored significantly higher in a problem solving situation than an individual could alone. However, this was true for high and average achieving students and not for groups of low-achieving students (Egerblach, 1976). This could suggest the need for low-achieving students in special or regular classrooms to be exposed and stimulated to the thinking, verbal comments, and problem solving of the higher-achieving students, since they do not gain from group problem solving activities carried out with low-achieving students only. However, the importance of peer leader modeling - using high divergent thinkers as models - in problem solving situations was not found to significantly influence the creative divergent production of the rest of the group in another study (Johnson, 1977).

Effect of Practice on Problem Solving

Could it be that the mere practice of problem solving skills could improve problem solving ability? Blumberg, in a study of K, 3rd, 6th grade, and even college students given problem solving tasks, concluded that all of the participants improved as they gained experience in solving problems (Blumberg, 1977). Another study supported the use of "warm-up" activities, such as free play and role-playing activities where the children were physically involved, to improve creative thinking. It was concluded that these types of warm-up activities positively influenced a psychological set for divergent production (Nash, 1975).

Significant differences were found in problem solving ability and/or creative thinking as a result of specific training programs in a number of studies (Boller, 1973; Treffinger, 1974; Jerman, 1973). However, Speedie concluded that short-term training (i.e. 14 weeks or less) may not produce long-term changes in divergent thinking abilities (Speedie, 1971). Clearly, a consistent, well-rounded problem solving program could do much in the way of improving problem solving ability and high levels of thinking.

Summary of Research

This research seems to support and suggest the following points;

1) Problem solving is very important with young children and is a valuable skill in the real world, yet a relatively neglected skill in current classrooms.
2) Problem solving behavior can be incorporated systematically into a program of training.
3) During Piaget's Concrete Operational Period of cognitive development (ages 7-11) high levels of mental activity can take place but true

understanding is not entirely possible without the use of concrete objects and/or activities.

4) Concrete learning and concept formation is more accurate as children's cognitive, perceptual, and conceptual skills are better developed (beyond preschool years).

5) Gaming, involving concrete, hands-on activities with a high level of involvement, can be used to increase problem solving ability.

6) Creativity, an important asset in problem solving, is most successfully enhanced by programs that involve active student involvement, capture student interest, and allow for emotional as well as cognitive functioning.

7) Classrooms allowing for individual freedom, flexibility, and strong self-esteems may be most conducive to encouraging problem solving ability.

8) Most groups do better than individuals in problem solving situations.

9) Low-achieving students may benefit by the thinking of higher achieving students since they do not gain from group problem solving activities carried out with low-achieving students only.

10) Problem solving abilities in general improves with practice and can improve significantly with long-term programs, producing long-term changes in divergent thinking abilities.

Chapter 3

A PROBLEM SOLVING APPROACH TO SOCIAL STUDIES

It is clear that a systematic problem solving process that meets the manipulative and motivational needs of children 6-11 years of age is needed in order for concepts to be internalized and understood. Since social studies at the elementary level involves a great deal of concept formation at the abstract level, and since this is not entirely possible until the end of the elementary years, the following steps are especially effective. I believe that social studies is the best area to use the suggested problem solving method although it can be used to teach a variety of topics.

Teacher's Role in Problem Solving

The role of the teacher in aiding problem solving behavior is tremendous. The effectiveness of positive reinforcement has been proven many times over by behaviorists. We reinforce those behaviors that we pay positive attention to. If we excitedly listen and respond to problems, ideas, and hypotheses that the children bring to us, then they will be encouraged to solve problems on their own. If we cut them off by not listening, by giving one of our many "pat" answers, or by solving the problem for them, then we are discouraging problem solving behavior. The way we respond to kids shows them what we think is important. It is difficult to avoid commanding or sending a solution. It may be even more difficult to act favorably or at least neutrally to

ideas that you may know are silly or unworkable.

The most difficult task of all, however, is guiding children's thinking into positive channels. What do we do next? Or how do we even start? Is there a certain method or a series of steps? I found it ironic to realize that while I was required to take, in my course of college training, the teaching of reading, mathematics, and language arts, not a single course was even offered on the teaching of problem solving. After talking to a number of colleagues and flipping through several college catalogues, it became evident that perhaps teachers in general have not been trained to successfully teach problem solving.

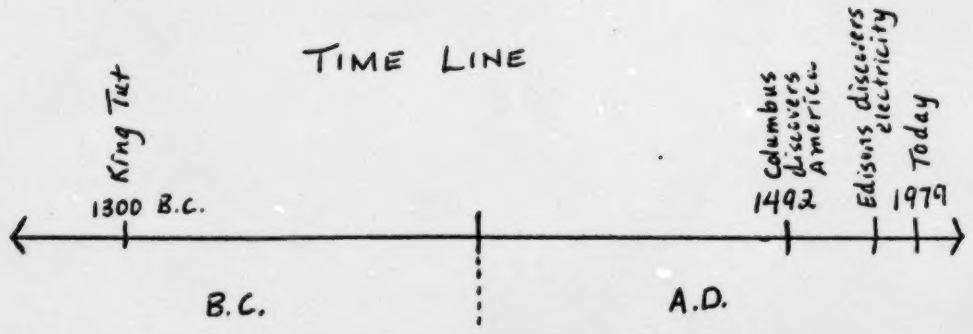
A 7 - Step Problem Solving Technique

The UCLA seven-step problem solving technique, used to teach social studies in the elementary lab school there, was used in the project. The steps are outlined as follows;

1) Play
2) Question
3) Hypothesize
4) Research
5) Children Share
6) Teacher Shares
7) Evaluate Thinking (Heimbeck, 1977)

Specific teacher verbalizations and descriptions will be given for each step in the process using a culture study of the early Egyptians - and "King Tut" - as a sample unit.

A study begins with a brief teacher introduction of the culture - or topic - under study. "Have you ever heard of King Tut?" Show where the culture under study is (or was) located on a map or globe, giving a few characteristics of the environment around them - "living near the equator caused them to live in a very hot climate...the land was sandy and dry...they did not have forests..." Draw out a time line, mark out



"today" and show the time under study. How important the conception of time is! Are we talking about today, yesterday, long ago, or long, long ago? Kids can grasp the idea of time if it is shown to them in meaningful ways! Mark off when America was discovered or when electricity was captured - this helps them to put things in perspective. Why, it wasn't so long ago that we got electricity when you compare it to the placement on the time line of the early Egyptians!

Step One - Play

Notice that this very first step involves concrete activity, active manipulation, and role playing. Not just talking - but doing! This may mean taking the entire class outdoors to spontaneously role-play King Tut's burial. Or allowing them to build the pyramids out of the blocks and role-play the burial with their own imaginary people or "paper" people. A teacher need not know everything there is to know about a culture or topic before a problem-solving lesson is started. The teacher need only do enough preliminary reading to have selected one small "scene" from the culture that could be described to the class in story form so that they can role-play it. In a Hopi Indian study the traditional rabbit hunt was described to the class. In the King Tut unit a short excerpt on the lavish procedures involved in the burial of

the King was read to the class. Instruct the children to close their eyes and try to really imagine what it must have been like as you read or tell the story. Their first "play" will spring from this "piece of information." They will know nothing more about the culture than what you have just told them.

Now - lay down the rules. There will be no breaking of the time line - in other words, "you are no longer a third grader in 1980, you are an Egyptian in the year 1320 B.C." Should someone slip and revert to such behavior, I give one warning before that child is removed from the play. Usually this is not necessary, however, for the kids themselves are the best monitors of each other's behavior. How often they will draw a straggler back into the swing of things! One way to discourage uninvolved play is to ask the class to choose a role - "What are you going to play? Are you going to be an Egyptian man, woman, servant, child, or animal?" Ask for volunteers to share with others what they plan to be. This tends to help them get right into role playing rather than ponder what to do. In this unit of study you may even want to appoint a volunteer King Tut and ask the class to decide where the main pyramid will be. My class decided the curved play bars outdoors would be the pyramid in which King Tut was buried.

The second rule is that there will be no talking to the teacher. The teacher's role during the play is one of observation only; the children must do their own problem solving without any direction or hints. The teacher keeps a pencil and paper in hand to record play observations that can later be used to prompt questions. Such notes might look something like this;

Matt - lay a wreath on King Tut's chest?
Mark & Jason - gather crowd together?
Gina - picking something?

Angi and Jeff - preparing King's body?
Loren, Kelly, Ben - pushing stones into pyramid?
John - climbing pole?

As soon as you can see that the majority of the children have "played" out their ideas, call or motion for them to go back inside. My signal is a raised hand and some sort of short positive comment such as,"What terrific Egyptians!" Usually the first time out the children's "play" lasts only 3-5 minutes. They have very little information with which to draw from at this point. The play portion of the problem solving technique will last longer and longer and will become more and more involved as the children gain more information on the culture under study.

Step Two - Question

The students return to a group area and the teacher writes on the chalkboard;

WHAT TO FIND OUT: WHAT TO MAKE:

What do we need to know about this culture to make our play better? What do we need to find out and what kinds of things do we need to make? The students list questions that they do not know the answer to and the teacher writes them on the chalkboard exactly the way they were stated. The questions involve problems that occured during the play. The teacher asks open-ended questions that are not too suggestive. Sample questions students asked were:

How old was King Tut when he died?
What were his treasures made of?
Did they live in pyramids?

If there is a lag in the children's questions or if they seem to need some prompting the teacher may pull out the play notes. "Matt, it

looked as though you were laying something on King Tut's chest. Could you share with us what you were doing?"

"I made a big wreath and put it on his coffin like they do at funerals."

"Do we know that the Egytians did that? Or do we need to find out?"

"We need to find out."

"Can you put it into the form of a question?"

"Did they put wreathes on coffins?" The question was written on the board.

"Loren, Kelly and Ben, I noticed you were pushing something very heavy. Can you tell us what you were doing?"

"We were sealing off the pyramid after we buried King Tut," explained one.

"And the rock was really heavy," said another.

"Do we know that they did that for sure? What do we need to find out so that you can do it just right next time?"

"How did they seal the pyramids?", he asked.

If heavy teacher prompting or modeling is needed this first time, then give it. Model several questions so that they get the idea. "How heavy was the stone? What was it made from? They had a lot of sand - do you think it was made of sand?"

A list of questions one class came up with is listed in Table 1. Anything that the kids could make to help their play was also listed - a coffin, tools, Egyptian clothes, etc. The children's questions are later put on large lined poster charts in clear black ink and posted in a prominent place in the room.

Step Three - Hypothesize

A new day and a fresh start is necessary for this next step. The questions on the chart are quickly reviewed. Then, selecting one general area of questions and writing them on the board, the children are to make guesses as to possible answers. We chose all of the questions about pyramids to start with. On the board was written the three questions they asked in this area:

1) How did they make the first pyramid?
2) How many people did it take to carry a pyramid stone?
3) Why did they build pyramids?

Other areas their questions seemed to fall into included the burial process, the discovery of King Tut's tomb, and Egyptian life in general. This latter area would include their food, clothing, and shelter, the three main areas of study covered in culture studies.

An excellent way for the teacher to prepare for this phase of the process is to list a page full of questions that s/he can ask the class to prompt guesses. A sample list of such teacher questions is included in Table 2. The children are to begin their guesses with "I think...". If a suggestion sounds unreasonable to anyone, they may say "I disagree" and state why. "Never laugh at any suggestion... this is time for everyone to think and use your mind...you are safe to say anything." The teacher writes all guesses on the board exactly as they were said. Even far-out, "ridiculous"-type of guesses are accepted as enthusiastically as the more logical ones. This is brainstorming! The only time a guess is erased is when someone disagress and gives a "sure" answer why it could not be so.

"I think it took 2000 people to lift a stone above their heads,"

was one guess. It was immediately written on the board.

"I disagree," said another student. "2000 people could not possibly fit underneath a stone to lift it unless it was as big as a field and the stones on the pyramids were not that big."

"Oh, ya, I guess so," admitted the first. What great thinking! And nobody's feelings were hurt! The guess was erased from the board.

Everyone is expected to contribute to this discussion. The teacher attempts to involve everyone. "Let's see, Mary, Karen, Eric...have not shared yet in the discussion. Everybody has good ideas!" Without putting these people on the spot, attempt to include them. Problem solving lessons can easily be dominated by the louder, more assertive and spontaneous divergent thinkers if they are not controlled. Others tend to think in a more analytic, reflective style. Common courtesy is expected during discussion. Everyone listens to each guess to make that person feel important. Reinforce such behavior by saying, "I like the way you are listening and looking at Mark and making him feel important." A list of sample student hypotheses are listed in Table 3. As soon as the guesses wind down keep up the pace and move to the next step.

Step Four - Research

By this time the kids can't wait to find out the right answers! They want to find out if their guesses are right! What a perfect motivator to research the answers - a traditionally dull, meaningless, boring social studies task that, as a child, I must admit I hated. The learners have given thought to possible answers and have dictated their ideas, so now can't wait to find the real answers. How much do students learn

when told to open up their social studies texts to page 57 to learn about the Chinese culture?!!

"Are you ready to see if any of your guesses are right?" The kids are eager. The more advanced readers are given a prepared 1-2 page ditto on the topic under investigation. They may find a private spot to read their paper away from the group. They are to read the stories 2-3 times and underline important sentences they want to remember. This search for "fascinating facts" is an excellent selective reading skill. At first some students find themselves underlining nearly the whole story. But soon they learn to become more discriminating in their reading. The requirement to read the story 2-3 times is an essential one as the readers tend to skim the story initially to find the answers to specific questions. How often I have enjoyed seeing a student scan to the very bottom of the story and exclaim, "I was right! They did....." Relevant reading!

The rest of the readers stay with the teacher in a small group and read over with him/her a large prepared chart including much of the same information as the dittos, only in easier sentences. The sentences are first read silently and then outloud by volunteer individuals. Finally the whole group reads the sentences outloud in choral fashion. Often these readers need the immediate repeating of these new ideas and the teacher can add in relevant explanations as needed. The chart up until now was covered with a large sheet of butcher paper so that a suspenseful unveiling could be made! A sample chart story is given in Table 4. As you can tell, the sample ditto story in Table 5 has more information but the main ideas are included in both research sources.

Preparing these research stories is probably the most time consuming

part of the problem solving process for the teacher. It is also a fascinating, mind-expanding task. Virtually any book, whether it be adult or elementary, can be used for information. The key is to comprehend and simplify the main concepts so that they can be written at the grade level you are teaching. This skill comes easier with practice. Ideally, this research should be prepared after the class has had a chance to question so that the teacher can focus in on what the students wanted to learn rather than what s/he perceives as being important for them to learn.

Such research, on interesting topics such as King Tut, broadens our minds as does leading the steps involved in the problem solving process. As adults and teachers, we often have not broadened our own cognitive processes and abilities. Talk about using "higher levels of thinking!"

Step Five - Children Share

As soon as everyone has had a chance to research the class is drawn back together in a circle. "What was one fascinating thing that you learned?" Each child orally shares something they have just learned. Since the excitement is high, hand raising is necessary. Try to call on the chart readers first for they were given less information from which to draw upon. It doesn't matter if another learner shared the same idea you were going to share...facts can be repeated. In fact, this repetition of ideas is a valuable one. "You may share a fascinating fact that someone else has already shared!" Everyone is expected to share at least once, and given this expectation, the kids respond. The children are encouraged not to share by directly reading their

underlined story but may of course use it if necessary. It can be a needed security! Sometimes they want to share again and again. But before their interest is lost...

Step Six - Teacher Shares

"Now it's my turn to share!" The teacher now has the time to share any pictures, objects, books, artifacts, etc. relevant to the discussion. At this time she can round off the sharing by reviewing and stressing the basic concepts, facts, and ideas presented. Any interesting additional information can be shared at this time also. It is important to repeat basic concepts during this time of summary.

Step Seven - Evaluate Thinking

The teacher goes back to the blackboard of guesses. "Let's go back and see how we thought..." The class reads back over the guesses and decides if they were right or not. The right ones are left on the board and the wrong ones erased. If a guess was almost right and could be corrected by simply changing or adding a word or two, this change is made.

"These were excellent guesses, but some just turned out not to be true...just because a guess happened to not be true, is it a bad guess? Of course not! We still did some great thinking!"

Finally the teacher goes back to the original chart of questions and checks off which questions have been answered. Sometimes questions other than the ones chosen for the purpose of guessing were also answered.

"Would you say we did some good thinking today?!?!?!"

"YES!!!" (We give positive strokes daily for work well done, but

how often do we reinforce children for really THINKING?)

NOW -- with the new information learned, the class goes back to play and the steps are repeated.

A weekly time line would look something like this;

Monday - 1) Play 2) Question

Tuesday - 3) Hypothesize 4) Research 5) Children Share 6) Teacher Shares 7) Evaluate Thinking

Wednesday - The class writes - or dictates - creative stories about what was learned. Their stories can include facts or simply be a take-off on ideas learned. Stories are shared later on in the day. Either the teacher or the author can read it outloud. It is surprising how much the quality of stories improves as soon as a few proud authors read them outloud to the class and as soon as positive comments are made.

Thursday - The children manipulate, build, and construct. If they needed a golden coffin to aid them in their play, then they get out the paper mache. If they needed carving sticks or loinclothes or sashes then they make them. They can build pyramids, coffins, Egyptian cities, and hundreds of other things from blocks in the block center. This active time helps to reinforce concepts even further, and may, in fact, be as essential as the initial steps in the problem solving process.

Friday - Get out the easels and let the children paint concept pictures about what they learned this week. Mix paints rich in the colors they may need - chocolate browns, golds, tans, rusts, several shades of greens or whatever they may need. Set aside the traditionally stifling colors that brag preschool fluorescence. The

pictures turn out much more aesthetic also when the artists are required to fill in the picture in its entirety. "Leave no unpainted holes!"

How Do You Select a Culture or Subject to Study?

Ideally some of the best studies are ones that spring from spontaneous student interest. What is meaningful and relevant to the students? If you live near an Indian reservation, as we do, you may want to study the Plateau Indians. Later you could do a study of the Coastal Indians so that the children could compare and contrast the cultures. Perhaps a student from Mexico just moved into your classroom. You may want to study the early Spaniards or the Mexican-Indian culture or even the Aztec Indians of South America. Or maybe a national display of Egyptian artifacts visited your city or state, as the King Tut exhibit did ours in 1978, which prompted both student and teacher interest in the early Egyptians.

Of course this is not always possible or even desirable. We wanted our students to study at least one ancient, non-existant culture this year so the teachers decided on the Incas of South America. (Where there's teacher interest, there's enthusiasm, and thus student interest!) The main point here is that you don't have to know about a culture before you start to study it with the children. We started the Inca unit by leading the first two steps in the problem solving sequence the very first day of school! In fact, knowing very little or nothing about a culture has its advantages. That way you might get more excited to question along with the children and later focus into finding the answers to their questions rather than tell them information you've already collected. Remember, it must be relevant to them!

The first day of school five second and third grade teachers led the first two steps in the problem solving sequence with their classes and were delighted with the results. The children were actually less inhibited to "play" since they didn't know each other yet and felt an initial success experience with the verbal questioning. It was our way of "throwing off their equilibrium" in order to stimulate meaningful learning. We sent a welcome letter home that told of our new study. We simply shared with the parents that we would be learning about the Incas along with the children so any or all information they might have would be appreciated.

That first week a wealth of material on the Incas was accumulated. The students brought in encyclopedias and books that proved to be very helpful. Parents later commented on how excited their children were about "playing Indians" and how they talked about the Incas at home. A trial experiment that we hope to continue to use!!

Social Studies Student Learning Objectives

With current accountability standards it is important to keep in mind objectives and generalizations that we are working to achieve. A list of student learning objectives including the strands of self-awareness, cultural awareness, environmental awareness, historical awareness, economic awareness, career awareness, reference skills and study skills is given. It is the author's belief that any culture study can be used to teach to nearly any or all of the objectives. It is the thought processes involved in the study, however, that are of greater value. The self-awareness objectives can be achieved as the students progress through the problem solving steps alone.

Social Studies Objectives - Elementary

Self-Awareness

The student will recognize and value the uniqueness of self and others.
The student will demonstrate a tolerance of diversity between one's own feelings and opinions and those of others.

Cultural Awareness

The student will compare his own culture to another.
The student will develop an understanding of how individuals depend on one another in their groups.
The student will know that every culture or community has customs which are affected by their beliefs and way of life.
The student will analyze ways in which cultures help humans meet their needs.

Environmental Awareness

The student will recognize the dependencies that people have on the natural environment.
The student will recognize how the environment influences the way basic needs are met.

Historical Awareness

The student will recognize that future communities will be different from today's.
The student will recognize historical changes in the ways people have thought.

Economic Awareness

The student will recognize that everyone has wants and needs and distinguishes between the two.
The student will recognize the dependencies people have on one another for economic goods and services.
The student will recognize that individuals everywhere must satisfy the basic needs of food, clothing and shelter.
The student will recognize how the environment of a community determines specialization (making or doing one thing) in a community.
The student will identify ways that people exchange goods and services.

Political Awareness

The student will recognize that rules are made to protect the rights of people in the community.
The student will recognize that groups can accomplish many things using coöperative group processes.

Career Awareness

The student recognizes that there are many ways to make a living.

Reference Skills

The student will locate major water bodies, continents and countries.
The student will locate the North and South poles.
The student will identify and name the four directions.

Study Skills

The student knows that he can use the encyclopedia to learn about people and places.

The student will paraphrase information from a book, magazine, or encyclopedia article either orally or on paper.

(Selah School District, 1979)

Culture Concepts - A Sample Unit

Concepts support and lead to generalizations. Under the generalization—

A culture's way of life is effected by its immediate environment and place on the time line...

1) What they eat (FOOD)
2) What they wear (CLOTHING)
3) What they live in (SHELTER)
4) How they live (WORK, RELIGION, ETC.)

would be the following concepts in our King Tut unit.

1) FOOD: The early Egyptians hunted African animals for meat.
They planted much of their food.
The Nile River was very important to the Egyptians. The layer of rich soil it left behind each year after it flooded enabled them to grow crops.
The Nile also allowed the Egyptians to water their crops because Egypt has no rain.

2) CLOTHING: The Egyptians wore light-weight clothing because their climate was warm.
They wove simple clothing from linen and made kilts of grass.
Jewelry was made of gold, ivory, alabaster and the many stones that the Egyptians had plenty of.
It was so warm that the children seldom had to wear clothes.

3) SHELTER: Their homes were made of mud-brick because mud, sand, straw and water were plentiful.
The walls of their homes were thin because Egypt had a warm climate.
Furniture was made of wood and stone.
The roofs on their homes were flat (sloping roofs are needed for rainy areas).

4) WORK, RELIGION, ETC.: The Egyptians planted and farmed all year except during the Nile flood.
At this time they feasted and celebrated and hauled stones for the pyramids.
Primitive tools and weapons were made of stone and wood.
They used the papyrus reed to make paper, rope, baskets, mats, sandals, etc.

Under the generalization —

Every culture has customs which are affected by their beliefs and way of life

would be the following concepts.

Death was very important to the Egyptians.
They felt that the "afterlife" was a better life than life on earth.
The Egyptians built pyramids to protect their King's bodies.
Mummification was a custom used to keep a body in good shape for the "journey to afterlife."
The royal family was very important to the Egyptians. That is why King Tut became King at the age of nine.
The Egyptians used hieroglyphics - pictures that spell words - for written communication. They enjoyed having their symbols look beautiful.

Other Units of Study

Many different social studies topics or units can be used to teach to social studies objectives. Concepts can be formed under any unit individually. The problem solving process, as outlined, can be used to teach to any of the following unit suggestions. Just make sure that you have concrete ways for the students to role play or build. A set of blocks can serve as a medium through which meaningful and necessary concrete manipulation can take place. Remember - let your imagination go crazy, for almost any topic will do!

Transportation - The Harbor, Airport, or all forms
Atlantis - Underwater Cities, Futurism
Desert Life
Ancient Egypt - Pyramids, etc.
Indian Cultures - Coastal, Native, Plateau, etc.
European History - Castles, Cathedrals, etc.
Chinese Culture
Energy - Solar reflectors, Nuclear reactors, windmills, etc.
Architecture - a historical sequence

Of course any culture could be studied. Whenever a culture study is made it is important to cover the basic needs of food, clothing and shelter. As a main concrete manipulative, blocks work especially well

for the construction of various cultural buildings, homes and types of shelter.

Summary

Current educational authorities across the country are saying that problem solving is the "thrust of the eighties." Problem solving was literally the theme of the entire National Conference of Teachers of Mathematics held in April of 1980. Workshop after workshop was held on the values of manipulative learning. The steps in the problem solving process, including active play, questioning, hypothesizing, researching, and sharing were stressed many times over. In fact, two sessions were held on the value of the verbal sharing and reflecting behavior that many teachers leave out even when they think they use problem solving techniques. Enthusiasm is the key as is appropriate pacing of the various steps in the social studies problem solving process.

Student learning objectives are great to teach to as long as we do not lose sight of the other creative dimensions of a child's -- and teacher's -- mind that need to also be developed. Perhaps our teaching in general is one-sided; we teach auditorially and abstractly and not visually and concretely.

Table 1

Sample list of questions second and third graders came up with during a "King Tut" Egyptian social studies unit.

Did they put wreathes on coffins?
Did King Tut die of sickness?
How did they seal the pyramids?
How heavy were the stones?
How did they make the first pyramid?
How many people did it take to carry a pyramid stone?
Why did they build pyramids?
What were their houses like?
Did the children help?
Did they wear clothes?
What did they make their clothing out of?
What did they eat?
Did they work all year long?
Did they have any fun?
Did they dance?
Did they live in pyramids?
Did they have animals to help them work?
Did they have money?
Did they have schools?

Table 2

Sample list of questions that the teacher could use to stimulate hypothesizing behavior from the students.

Was King Tut buried in a pyramid?
Do you think pyramids were safe from robbers?
Why would anyone want to rob a tomb?
What materials did the Egyptians have available to them to build stones out of?
How might they get the stones the right shape?
How could they measure?
Do you think the stones were heavy or light?
Did they have machines to haul the stones with?
How many people do you think it would take to lift or carry a stone?
How did they get the stones up to the top?
How long do you think it took them to build pyramids? A few days? A week? A month? A year? Many years?
How high were their pyramids?
Why did they need a place to bury Kings?
Did they bury everyone in a pyramid? Why or why not?
What else did they use pyramids for?
Was death important to the Egyptians?

Table 3

Sample list of student hypotheses about Egyptian pyramids by second and third graders.

It took ten people to carry a stone.
It took five years to build a pyramid.
Maybe they put glue, mud or moss between the stones to make them stick together.
The Egyptians lived in pyramids.
They carved the stones with tools made of rock and wood.
They used rock stones.
They molded sand stones to make the pyramids.
They could have gotten the big blocks up to the top with steps or ladders.
Their pyramids were taller than our school.
Kings were important so they buried them in pyramids.
Children helped build the pyramids.
They made ropes of vines to help drag stones.
They made wheels to help carry stones.

Table 4

Sample chart story for beginner readers. The teacher reads over the chart with the students several times.

The Great Pyramid

The Great Pyramid was as tall as a 40-story building.

2½ million heavy blocks of limestone were used to build it.

Each stone weighed between 2 and 15 tons.

It took over 100,000 people 20 years to build it.

Many died. Each block had to be cut with stone tools to fit in place. The Egyptians measured very carefully.

The heavy blocks were floated down the Nile River.

The Great Pyramid was built to protect KING CHEOPS body.

Secret passages and rooms were inside.

All of his treasures were buried with him.

They left ramps around the outside of the pyramid for heavy stones to be pulled to the top.

Table 5

Sample research story for advanced readers. The students are encouraged to skip words they do not know and read through the story two or three times, underlining fascinating facts they may wish to later share. The story should be typed in primary type, if possible.

THE GREAT PYRAMID

The GREAT PYRAMID was built to protect the body of a later King, KING CHEOPS. A clever builder found a way to make it more difficult for the robbers to break into. This Great Pyramid had secret tunnels built into it. It is said that the Great Pyramid took over 20 years to build. Over 100,000 men, women and children spent part of their lives building the Great Pyramid. Each person spent three months a year working on it.

The cost of the Pyramid was huge and the country fell into heavy debt. Thousands of workers died building Cheops' tomb. Even after his death, still more Egyptians died for the King. King Cheops ordered that after he die the priests kill these people to honor the pyramid.

The Great Pyramid stood 480 feet high - about as tall as a 40-story building. To build this huge tomb, many workers cut giant blocks of limestone. Each block had to be cut with stone tools to fit in place. Workers carried these great, heavy blocks to the mouth of the Nile River. Over 2½million stones were used. Each giant block weighed between 2 and 15 tons. Some stones were taller than the people who had to move them. Then they were lifted onto rafts and boats and floated down the river. Finally they reached the Valley of the Pyramids.

The base of the Great Pyramid is over 7 city blocks long. The Egyptians left ramps around the outside of the pyramid for heavy stones to be pulled to the top. The trip to the Nile was made through the deadly dessert. Thousands of workers died from heat and thirst. How could they have lifted and moved those gigantic blocks across the dessert? No one knows.

King Cheops was not buried at the bottom of the Great Pyramid. Instead, he was buried close to the top. There were separate rooms for the King, Queen and their children when they died. In each room there were golden thrones, beautiful pieces of furniture and frightening statues. All the treasures of their life were buried with the King and his family.

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